Run Plan for FY09/10

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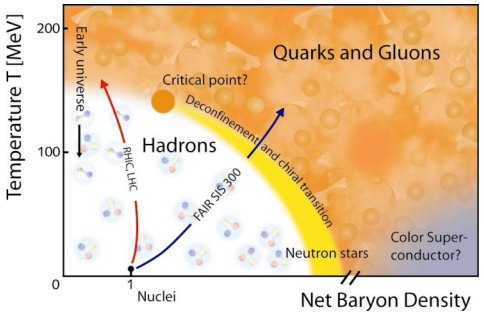
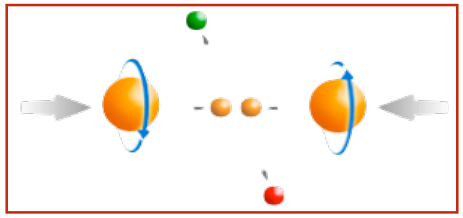
STAR Physics Focus at the QCD Lab

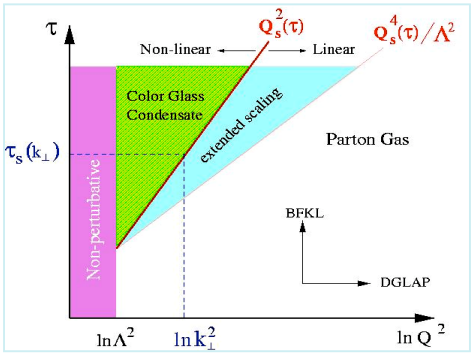


1) **Heavy-ion program**
   - Study ***medium properties, EoS***
   - pQCD in hot and dense medium

2) **RHIC beam energy scan**
   - Search for ***critical point***
   - Chiral symmetry restoration

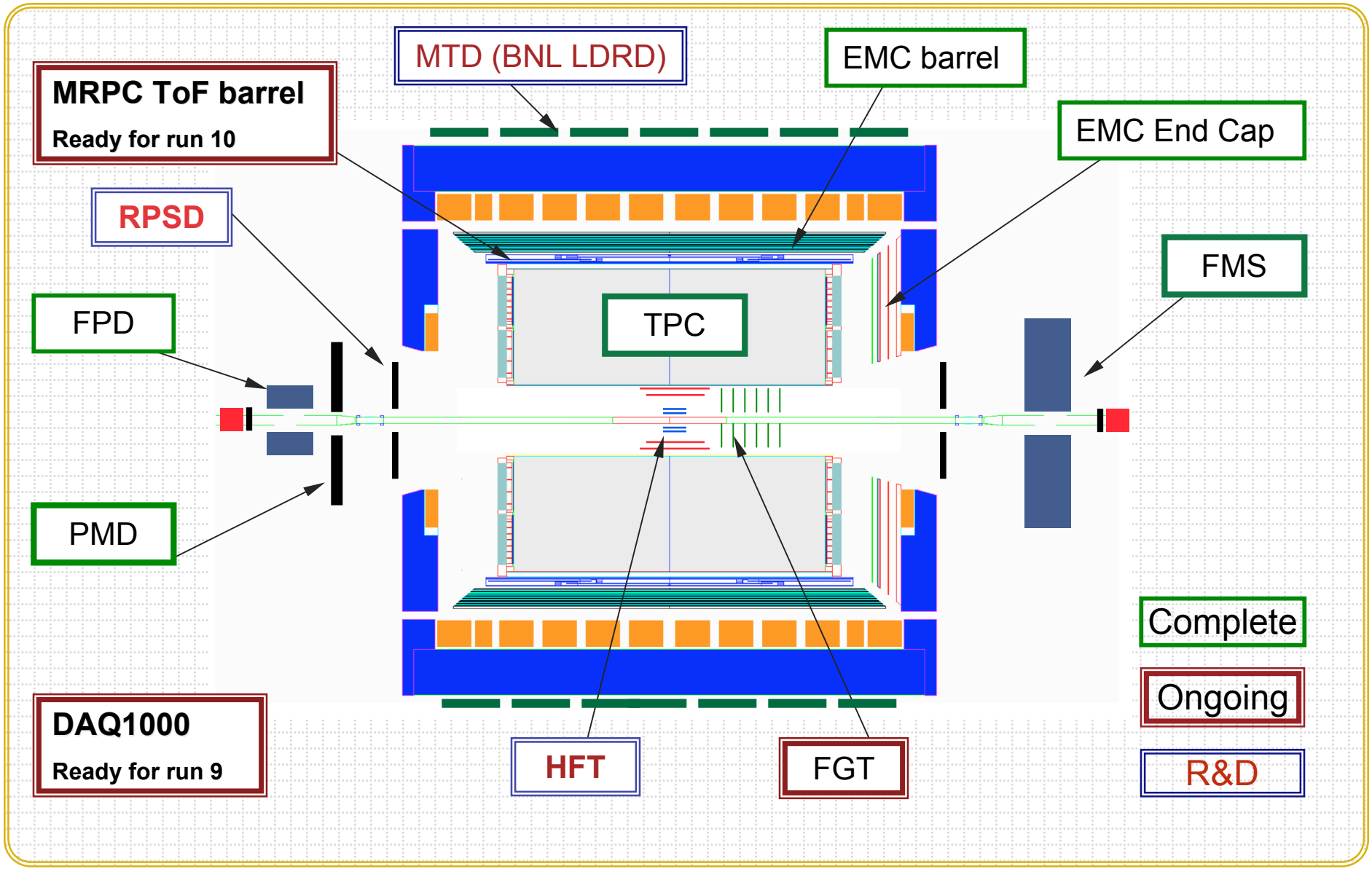


Polarized spin programs
   - Study ***proton intrinsic properties***



Forward programs
   - Study low-x properties and search for ***CGC***
   - Study elastic and inelastic processes (pp2pp)
   - Investigate ***gluonic exchanges*** and search for ***gluonic matter***

STAR Detector and Upgrades



3) Near Future Runs

STAR priorities for near future runs:

(1) 200 GeV longitudinally polarized p+p collisions
- $\Delta g(x)$, ***FOM = P^4L = 6.5 pb^{-1}***

(2) 500 GeV longitudinally polarized p+p collisions

FOM = P^4L ~ 1.5 pb^{-1}

First measurement of A_{LL} for inclusive jets

First measurement of A_L for mid-y W production (W^+)

(3) Beam energy scan down to $\sqrt{s_{NN}}$ ~ 5-6 GeV

- Search for the QCD phase boundary and tri-critical point

* Very high priority for STAR physics program
  Closely working with C-AD to assure the low energy runs

(4) 200 GeV Au+Au collisions (low material run)

200M central events / 300M M.B. events / 2 nb^{-1} trigger events

High p_T J/ψ and v_2 of J/ψ

Jet trigger multi-hadron correlation, PIDed correlations

Starting the di-electron invariant mass program

2008 PAC Recommendations

Fiscal Year	Colliding Beam Species/Energy	Comments	Upgrades	Starts
2009	200 GeV p+p	6.5 pb^{-1} on ΔG measurements		Feb. 15, 2009, 17-19 weeks
2010	500 GeV p+p	commissioning		25 weeks
	200 GeV Au+Au	HBD/Low material run		
2011	RHIC Energy Scan (I)	Phase boundary search		
	200 GeV U+U	1st run with EBIS		
2012	500 GeV p+p	1st long 500 GeV run	FGT HFT patches	
	200 GeV Au+Au	Long production with stochastic cooling		
2013	500 GeV p+p	~ 300 pb^{-1}, DOE milestone on W	Full HFT Forward detectors	
	RHIC Energy Scan (II)			
	200 GeV p+p	γ-jet		

Run 9: 25 Cryo-week (scenario I)

STAR priorities for Runs 9 and 10:

(1) 200 GeV longitudinally polarized p+p ***- Δg(x)***

(2) Beam energy scan down to $\sqrt{s_{NN}}$ ~ 5-6 GeV

- Search for the QCD critical point

** C-AD transverse stochastic cooling test important!

Run	Energy (GeV)	System	Time	Goal
9	$\sqrt{s}$ = 200	$p_{\rightarrow}\, p_{\rightarrow}$	12 week	50 pb^{-1} P^4L 6.5 pb^{-1}
	$\sqrt{s}$ = 500	$p_{\uparrow}\, p_{\uparrow}$	2 week	Commissioning
	$\sqrt{s}$ = 200	$p_{\uparrow}\, p_{\uparrow}$	½ week	pp2pp
	** $\sqrt{s_{NN}}$ = 200	Au + Au	3 week	0.3B minbias, 0.5 nb^{-1}
	$\sqrt{s_{NN}}$ = 5	Au + Au	½ week*	Commisioning
10	$\sqrt{s_{NN}}$ = 39 – 6.1	Au + Au	14 week	1st energy scan
	$\sqrt{s_{NN}}$ = 5	Au + Au	1 week	Commisioning
	$\sqrt{s_{NN}}$ = 200	Au + Au	2 week	200M central
	$\sqrt{s_{NN}}$ = 200	Au + Au	1 week	50M central
	$\sqrt{s}$ = 200	$p_{\rightarrow}\, p_{\rightarrow}$	½ week	pp2pp
	$\sqrt{s}$ = 500 or 200	$p_{\uparrow}\, p_{\uparrow}$ or $p_{\rightarrow}\, p_{\rightarrow}$	4 ½ week	Spin studies

To do list

1) Prepare p+p run

2) Arguments for RHIC energy scan program:

   Two step approach

   Step 1: $\sqrt{s}$ **= 60 - 10(8) GeV** with PHENIX (10 weeks)

   Step 2: $\sqrt{s}$ **= 20 - 5 GeV**

   Observables:

   Onset of thermal dynamic: $\langle K^+/\pi \rangle$, $\langle p_T \rangle$, $\langle \Delta p_T, \Delta p_T \rangle$, …

   Disappearance of: jet-quenching, $v_2(\phi)$, …

   Theory predictions: fluctuation ***u/s***-quarks

3) Prepare trigger detector for the future RHIC energy scan runs